United States General Accounting Office

GAO

Report to the Chairman, Subcommittee on Mining and Natural Resources, Committee on Interior and Insular Affairs, House of Representatives

MINERAL RESOURCES

Federal Helium Purity Should Be Maintained

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-246022

November 8, 1991

The Honorable Nick J. Rahall, II
Chairman, Subcommittee on Mining
and Natural Resources
Committee on Interior and Insular
Affairs
House of Representatives

Dear Mr. Chairman:

In response to your request, we are examining various proposals on how to best meet federal needs for helium. Currently, the Department of the Interior's Bureau of Mines Helium Operations manages the federal helium program. The proposals we are examining include meeting federal needs through (1) the Bureau's program, (2) private industry instead of the Bureau's program, and (3) a program that allows federal users to choose between the Bureau's program and private industry. We plan to report on the results of our examination of these proposals at a later date.

During our review, however, we became aware of a Bureau practice that may result in the accelerated degradation of the purity of stored federal helium. Because the accelerated degradation of federal helium purity could result in additional cost to the government, we are reporting on this issue now so that the Bureau can begin corrective action.

The Helium Act of 1960 (50 U.S.C. 167-167n) authorized Interior to conserve, buy, store, produce, and sell helium to meet government needs. During the 1960s and early 1970s, the Bureau purchased a large volume of helium. This helium is stored, to ensure its availability for current and future federal use, in Cliffside, a natural gas field near Amarillo, Texas. The helium is extracted and refined for use in the space program, weapons systems, and medical and scientific projects. To help smooth fluctuations in private industry's supply of helium, the Bureau also allows private companies to store helium in Cliffside, where it is commingled with the federal helium.

The purity of the stored helium diminishes (degrades) over time as it mixes with the natural gas. Moreover, when extracted at an excessive rate, the degradation is accelerated because the natural gas surrounding the helium is pulled toward the wells faster than the helium. This causes the helium to mix with the natural gas more rapidly and to form in small

pockets that are not adjacent to the wells. As a result, larger volumes of the mixture of natural gas and helium must be extracted to obtain the needed helium.

Results in Brief

Under the terms of its storage contracts with private companies the Bureau can restrict the rate at which privately owned helium is extracted from Cliffside. However, the Bureau has not imposed such a restriction, pending the Bureau Director's review of a 1989 Bureau study on this issue. In the interim, helium is being extracted at a rate that may degrade the purity of the remaining helium—both federal and private—faster than would otherwise occur. Because larger volumes of the mixture of natural gas and helium must then be processed to extract and refine the less pure helium, the federal government could incur additional costs that could amount to as much as $23.3 million in 1991 dollars through 2050.

Background

Certain natural gas fields contain a relatively large amount of naturally occurring helium, which can be recovered as a secondary product. The helium is separated from the natural gas and stored in a concentrated form that is referred to as crude helium because it has yet to go through the final refining process. Because natural gas production varies to meet seasonal demand, production of crude helium, as a secondary product, also varies. This creates periodic imbalances between the supply of and demand for crude helium in private industry.

At Cliffside, crude helium is injected into storage through above-ground wells and forms a "cloud." The cloud is at least 70-percent pure helium at its center, with the purity declining toward its edge as it mixes with the natural gas.

Because of the periodic imbalances between crude helium supply and demand in private industry, private companies need a place to store their excess crude helium. The Bureau allows the private companies to store their crude helium in Cliffside, where it is commingled with the federal helium, and to extract it as needed. As of May 1991, about 1.7 billion cubic feet of private helium was commingled with 32.3 billion cubic feet of federal helium in Cliffside.

The Bureau charges these companies a storage fee, and the storage contracts provide that the Bureau may specify extraction rates. The Bureau does not currently have an extraction rate limit in place.

Excessive Extraction Rates Accelerate Helium Degradation

A 1989 Bureau study concluded that because the Bureau was not restricting the rate at which helium was being extracted from Cliffside, the purity of the remaining helium cloud was being degraded faster than would otherwise occur. Because of this accelerated degradation, Bureau engineers determined that the Bureau is incurring additional costs to extract and refine federal helium from Cliffside. Appendix I shows the shape and degraded purity of the helium cloud at estimated stages of the field's depletion, on the basis of current extraction rates.

Although some mixing with the natural gas is inevitable, according to the Bureau's 1989 study, it should be minimized so that the helium cloud's purity can be maintained at as high a level as possible in order to avoid additional future costs to extract and refine federal helium. Bureau engineers concluded that accelerated degradation can be avoided by restricting total extractions from Cliffside to 3 million cubic feet of helium daily. At the Bureau's request, an outside petroleum engineering consulting firm reviewed the Bureau's engineering, geologic, and other studies and agreed that an extraction rate restriction of 3 million cubic feet a day was needed to protect the purity of the stored crude helium.

In a March 30, 1989, letter to the private companies that store helium in Cliffside, Bureau Helium Operations informed them that the Bureau would restrict total daily extractions to 3 million cubic feet, beginning on October 1, 1989. The letter explained the degradation caused by excessive extraction rates and stated that Bureau extractions would receive priority. It noted that if the companies needed to extract amounts that, when combined with Bureau extractions, would result in the extraction rate's exceeding 3 million cubic feet per day, the companies' extractions would be cut back to ensure that the limit was not exceeded. Because the companies store different amounts of helium in Cliffside, the Bureau's Helium Operations determined that when such a cutback was needed companies would receive allocations on the basis of their proportionate volume of helium in storage.

The Chairman of the Helium Advisory Council, an industry association, expressed concern to the Director of the Bureau that the restriction might adversely affect private companies' ability to obtain crude helium to meet their needs. Sensitive to this concern, the Director ordered Helium Operations to rescind the restriction until he had an opportunity to review the study and supporting documentation. Helium Operations rescinded the restriction on April 19, 1989. In August 1991, the Director informed us that he had not reviewed the study. In October 1991, he told us that he is in the process of reviewing the study.

Corporate officials from the three major companies with helium stored at Cliffside told us that their engineers disagreed with the Bureau's reason for restricting the helium extraction rate. They stated that the Bureau's use of natural gas from the Cliffside field to fuel the Bureau's helium refining plant is causing the accelerated degradation to the cloud, not the helium extraction rates. Officials from the three companies also told us that restricting the rate of helium extraction from Cliffside could disrupt the private helium market by causing temporary shortages in the supply of refined helium. However, they were unable to substantiate these assertions.

Bureau engineers told us that natural gas is extracted from wells on the periphery of the Cliffside field. They stated that the purity of the stored helium cloud is therefore not affected by the extraction of fuel gas. They also told us that the Bureau can continue its current usage rate for fuel gas for the next 20 years without accelerating the degradation of the helium cloud.

Bureau data for the 2-year period from April 1989 to April 1991 showed that the daily total extractions from Cliffside exceeded 3 million cubic feet on 99 days, or 13 percent of the time. Bureau engineers have estimated that if the helium cloud continues to be degraded at the current rate, the Bureau will incur additional costs of as much as $23.3 million in 1991 dollars to extract and refine federal helium from Cliffside through the year 2050.[1] Appendix II shows the Bureau's projected additional costs.

Conclusions

The Bureau rescinded the restriction on helium extraction over 2 years ago pending a yet-to-be completed review of its study and supporting documentation. This inaction may have resulted in the purity of the remaining federal and private helium stored in Cliffside being degraded faster than would have otherwise occurred. Because of this accelerated degradation, the federal government could continue to incur additional costs to extract and refine the remaining stored federal helium. Since the purpose of Cliffside is to store federal helium to ensure its availability for current and future federal use, the Bureau should not continue to incur the additional costs associated with private extractions.

[1]The Bureau estimates that at historic usage rates, the stored federal helium will be depleted by the year 2050.

Recommendations

So that the helium cloud at the Cliffside field can be maintained at the highest level of purity possible, thereby avoiding additional Bureau costs to extract and refine federal helium, we recommend that the Secretary of the Interior require the Director of the Bureau of Mines to complete his review of the Bureau's 1989 study and any related documentation, including that which private industry can provide, and, if warranted, specify an acceptable extraction rate. If an extraction rate is specified, the Bureau should either (1) restrict private company extractions of helium from Cliffside so that they do not cause total daily extractions to exceed this rate or (2) impose a charge on the private companies that store helium in Cliffside each time their extractions, combined with Bureau extractions, exceed the established acceptable rate. This charge should cover all estimated additional costs associated with the accelerated degradation of the helium cloud caused by private company extractions and could be adjusted from time to time.

Scope and Methodology

We performed our work at the Bureau of Mines Helium Field Office in Amarillo, Texas. We interviewed Bureau management and engineering officials and reviewed the Bureau's 1989 study of helium extractions from Cliffside and supporting documentation. We also contacted corporate officials from the three major private helium companies that store helium in Cliffside. We conducted our work for this report between November 1990 and August 1991 in accordance with generally accepted government auditing standards.

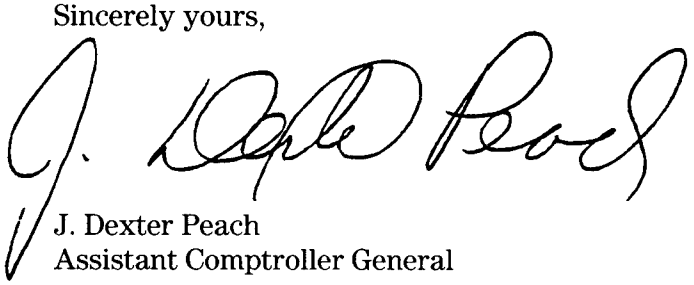
We discussed the results of our work, including the facts and our conclusions, with the Director of the Bureau of Mines, the Bureau's Assistant Director for Helium Operations, and the General Manager of the Bureau's Helium Field Office and have incorporated their comments where appropriate. These officials generally agreed with our conclusions.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time we will send copies to the Secretary of the Interior, the Director of the Bureau of Mines, and other interested parties, and make copies available to others upon request.

This report was prepared under the direction of James Duffus III, Director, Natural Resources Management Issues, who may be reached on

(202) 275-7756 if you or your staff have any questions. Other major contributors are listed in appendix III.

Sincerely yours,



J. Dexter Peach
Assistant Comptroller General

Contents

Abbreviations

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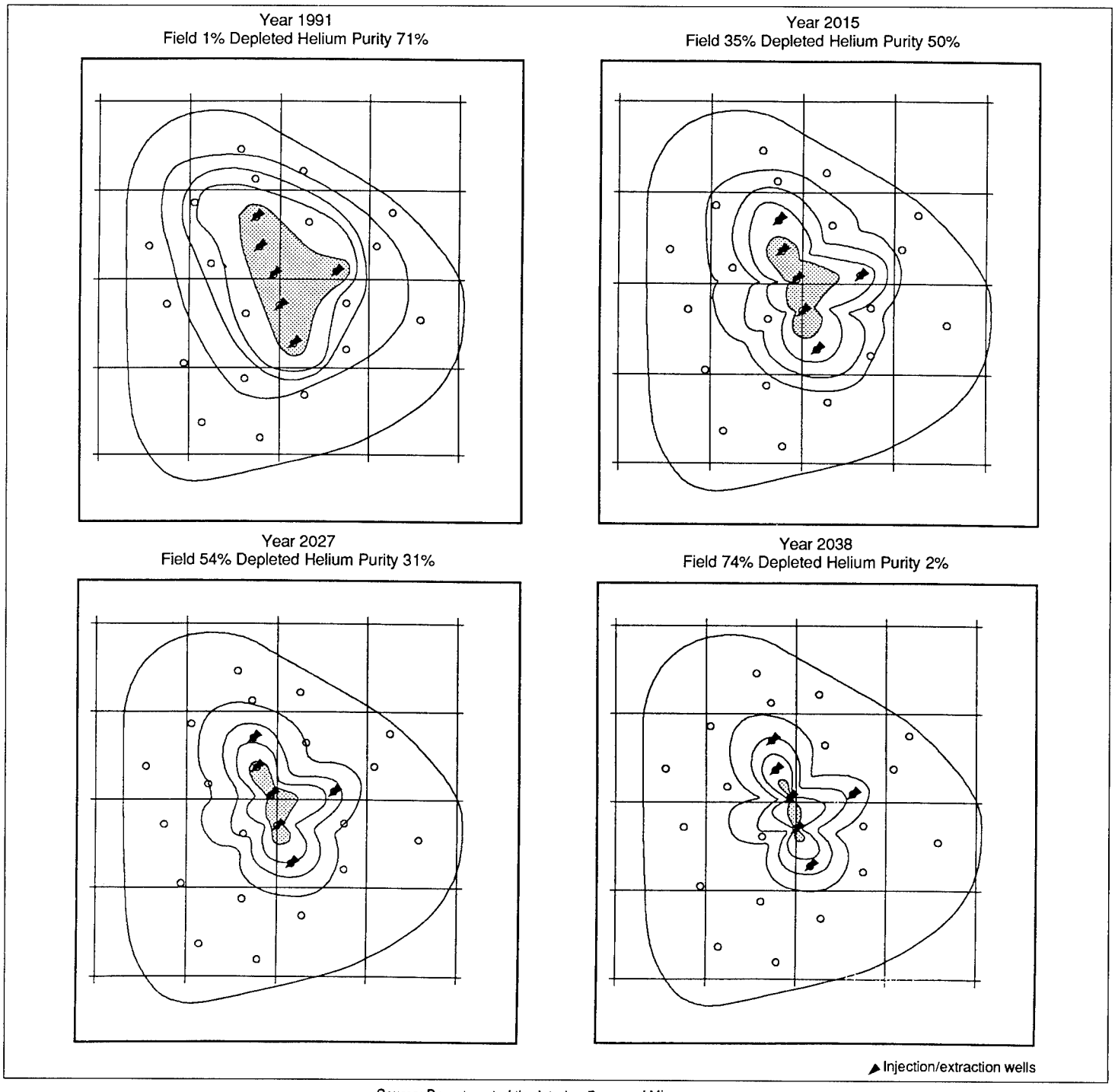
Projected Shape and Purity of Federal Helium Storage Cloud If Private Company Extraction Rates Are Not Restricted



Source: Department of the Interior, Bureau of Mines.

Cumulative Additional Costs to Extract and Refine Federal Helium If Private Company Helium Extractions From Cliffside Are Not Restricted

Through year	Cumulative additional costs
1991	$3,000
2015	$659,000
2027	$2,148,000
2038	$12,016,000
2050	$23,278,000

Note: 1991 dollars.

Source: Department of the Interior, Bureau of Mines.

Major Contributors to This Report

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